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ABSTRACT

A study was undertaken to explore the processes underlying the relationship between television viewing and reading achievement. Subjects were 580 second, third, and sixth grade students from nine schools in four different geographical regions in order to provide a cross-section of students in terms of socioeconomic status (SES), urban/rural environment, and racial and ethnic background. The subjects kept television viewing logs for seven days and then completed an extensive questionnaire eliciting demographic information, television viewing and reading habits, and school behavior information. Path analysis was then used to chart connections between the subjects' SES, home environment, amount of television usage, and cognitive involvement and their television and reading achievement. Results showed that (1) reading abilities are dependent upon more than just the formal instruction offered by schools, (2) certain orientations toward reading or television can augment the effects of the amount of reading or viewing a child does, and (3) it is possible to locate an orientation within the television sequence that positively predicts reading achievement, with cognitive involvement with television representing skills that parallel those necessary for good reading in sixth grade students. (FL)

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TELEVISION VIEWING BEHAVIOR AND THE DEVELOPMENT OF READING SKILLS: SURVEY EVIDENCE

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Television Viewing Behavior and the Development of Reading Skills:
Survey Evidence

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Although concern with how television influences children's school achievement has a history dating almost from the irtroduction of the medium (Furu, 1962; Himmelweit et al, 1958; Schramm, Lyle & Parker, 1961), it has really been only over the past decade that empirical studies concerned with the televiewing/academic achievement relationship have begun to appear in any numbers. It is encouraging that researchers have begun to examine the issue; nevertheless, it is worth noting that although most studies produce negative correlations, the research is characterized by demonstrations of simple bivariate relationships only infrequently clarified through the introduction of control variables. In a paper delivered to this convention just three years ago, Hornik (1981) noted that most studies seldom go beyond reporting two variable relationships, that the few studies that introduced control variables tended to wash out much,if not all,of the negative relationship typically found in bivariate analyses, and that almost no work addressed itself to exploring the mechanism or underlying processes that might account for whatever relationship between television viewing and achievement exists.

In this paper, we will report some of our own attempts to examine the television-reading achievement relationship within the context of a number of controls, and to begin to explore some of the processes underlying the relationship--an effort stimulated at least in part by Hornik's (1981) critical review of work in the field.

Before attempting to understand the underlying mechanisms, we need to spend a few minutes considering the nature of the two principals in the relationship--television viewing at the input end and reading achievement at the output end. We begin here because we are uncomfortable with the rather simple, unidimensional approach to each of these variables that typifies research in this area.

A measure of "amount of television viewing" is frequently chosen to be the key variable representative of an entire cluster of television activities and attitudes. This operationalization of television behavior as number of hours viewed at least implicitly follows a model of additive effects, assuming that regardless of which effect is assigned to television, the more TV watched, the larger the effect. A problem with this view is that it ignores the influence of such mediating variables as attitudes, involvement, reliance on the medium for a variety of gratifications, environmental contingencies, and so on, any of which affect reading behavior in very complex ways. Relating only amount of television viewed to reading variables, then, may decrease the chance of locating or explaining important relationships which are better reflected by other associated television variables.

Even accepting that amount of television viewing is an adequate predictor variable, or at least a key variable in the television-viewing-reading achievement relationship, there are some methodological problems to consider. Mass media researchers generally acknowledge that amount of television-viewing is a difficult variable to measure reliably (Comstock et al, 1978). For example, people tend to answer questions about how much TV they watch quite differently depending on whether it is qualified by "yesterday," "in general," or "on the average weekday." When the question is

asked of children, the problems multiply (Roberts, 1973). Children give very unreliable estimates of the time spent in all activities. The youngest tend to remember and expand only the most important events of any given day, so that both the composition of a day's activities and the corresponding time estimate is apt to be misleading (Medrich, Roizen, Rubin & Buckley, 1982). In terms of assessing hours spent viewing television, then, it seems that a method which includes a measure of aided recall would be most helpful in getting accurate information. Breaking the day down into smaller segments for establishing time estimates for viewing hours, or providing a viewing log with "yesterday's" programs are two ways of dealing with the reliability problem that we have attempted.

At the output end, the reading achievement variable is usually represented by the scores from one of a variety of standardized tests. Some studies rely simply on the total reading score. Others include analyses and comparisons of the various components of the total reading score (Morgan, 1980; Morgan & Gross, 1980a, 1980b), an approach which recognizes that reading achievement is a complex construct, different elements of which may be differentially influenced by television behaviors. Moreover, as with amount of television viewing, reading achievement test scores, whether in total or in each of its various components, are but one facet of a larger complex of behaviors, attitudes, and cognitions related to reading. To the extent that one is interested only in skills, standardized test scores are appropriate and reliable. However, focusing only on the skill dimension of reading increases the chances of missing some important, possibly explanatory, relationships which might present themselves in the forms of reading attitudes, reading behaviors, perceptions of the reading environment, and so forth.

In short, even though we will sometimes report results based on single measures of amount of television viewing and standardized reading scores, we do so with the caveat that we believe reliance on such single measures inflates the importance of those variables in the larger context of reading and television behavior. Given that little is known about this relationship--when and how it operates and for which groups of children--single measures are likely to add only minimally to our understanding.

What is it, then, about amount of television viewing that might influence a child's performance on reading achievement tests in particular, and reading behavior in general? Some clues to possible mechanisms are contained in Hornik's (1981) list of hypotheses about the relationships between televiewing and school achievement in general. Although few of these hypotheses have been put to empirical test, they nevertheless provide a framework for looking at possible connections between television behavior and reading behavior. Briefly, these include:

1. displacement - television takes away from time otherwise given to reading or school-related activities;
2. intolerance for the pace of schooling - television moves at such a rapid pace that school is dull by comparison, leading children to lose interest;
3. interest stimulation - TV stimulates interest in the subjects it covers, leading children to following up and/or paying more attention in the classroom;
4. learning of school equivalent content - television supplements school-based learning by its treatment of many of the same subjects;

5. new cognitive skills - mastery in processing television information develops new cognitive skills in children, which either overlap or compete with certain reading skills;
6. learning of instrumental information - television teaches children what to do and expect and how to behave in school, and this information structures their attitudes and behaviors.

Although these hypotheses were formulated as possible processes underlying a relationship between achievement and amount of TV viewing, it seems to us that several of them might be better examined in terms of television viewing behaviors that go beyond simple hours of watching. For example, what a child views could certainly be expected to influence hypotheses three, four, and six. Similarly, the various uses children have for television--for example, to learn or to escape--could also elaborate some of the hypotheses. That is, how and why children use television seem pertinent to explanations based on interest stimulation, learning of school equivalent content and the acquisition of new cognitive skills. Indeed, even the displacement hypothesis, which appears to be closely linked to amount of viewing, may be further moderated by the nature of the child's media environment (are there print materials available to be displaced) or by attitudes toward school and schooling that have little to do with television watching.

The importance of going beyond simple bivariate studies to conceive of television and reading behaviors in more complex terms is demonstrated in several recent studies. Morgan and Gross (1980a, 1980b) approach the task by applying various controls to the television viewing/reading achievement relationship, and by looking at the nature of the relationship within various subgroups of children. Both procedures have revealed that the relationship is complex indeed. They found that the negative correlation

persists even when controls for socioeconomic status, sex, grade in school, amount of non-school reading, hours spent doing homework, and parental attitudes about reading are applied. However, not only does controlling for IQ make a significant difference, but the difference varies in interaction with some of the other controls. That is, the negative association between televiewing and reading achievement remains strong for the high-IQ children, but for low-IQ girls the association changes in sign to become positive. Moreover, low-IQ boys manifest non-linear relationships in the form of an inverted-U on various subsets of reading achievement tests. The authors conclude that "heavy viewing seems to 'preclude' having a high IQ more than light viewing 'allows' it." The scores within the heavy viewer, low-IQ group have much less variance than the light viewers' IQ scores.

Morgan and Gross (1980a) also discuss results from a panel of 216 students, from whom additional information about reading behavior--amount of time spent of outside reading and type of reading materials preferred--was collected. Results from the first year of the study showed heavy viewers spending less time reading. Surprisingly, however, they found a significant positive correlation between first-year viewing and third-year reading, just the opposite of what we would have expected. None of the standard controls change the basic pattern of results: heavy viewers read more and light viewers read less over the three-year period. Looking at types of reading materials preferred (e.g., non-fiction, teenage stories, science fiction), however, there is a trend for the heavy viewers to read more love and romance stories and stories about movie stars. Light viewers tend to read science fiction, mysteries, and non-fiction. Regretfully, the study did not obtain information about whether the students were reading books, magazines, or comics, but it is quite possible to speculate that

heavy viewers may be reading magazines and "supermarket novels," while light viewers are reading books.

These results, and the speculation they engender, suggest the importance of including additional measures of reading and television behavior in studies which hope to explore or explain the reading achievement/television viewing relationship. Amount of viewing is but one part of a complex of viewing behaviors. Amount of reading and reading achievement are also just subsets of more generalized reading behaviors. What is viewed or read, with what kind of family support structure underlying the reading or television environments, what "uses" children have for viewing or reading, their orientation toward books or television--all are important in answering the more general question of how television and reading behaviors relate.

Thus far we have discussed reading and television from a communication point of view, with no regard for either reading skill acquisition theory or developmental differences, neither of which, we believe, can be ignored. For example, the Morgan and Gross (1980a, 1980b) sample discussed above contains respondents from the sixth through ninth grades. Reading development theory, however, indicates that by the sixth grade, the child has already passed through several important stages. (Resnick & Weaver, 1979). Moreover, given what we know about developmental changes in television behavior (Comstock, et al, 1978; Roberts, 1973; Wackman & Wartella, 1977), it would not be surprising to find that television might interact different with various reading measures in each of the developmental stages. Consider, for example, one theory of reading development proposed by Chall (1979, pp. 42-43).

Stage 0. Prereading stage (Birth - Kindergarten).

During this stage, children develop the visual, visual motor, and auditory perceptual skills needed for Stage 1. Feldman (1976) argues that individual characteristics, environment and experience interact to develop prereading skills and ability.

Stage 1. Initial Reading or Decoding Stage (grades 1-2).

Children learn letters and how to match them with spoken words. Mastery of the alphabet is a key benchmark.

Stage 2. Confirmation, Fluency, Ungluing from Print (grades 2-3).

Children consolidate Stage 1 learning through reading familiar stories, and in this way gain fluency. Reading is not for learning per se at this stage. Most children practice their decoding knowledge. It has been shownthat if by grade 3, achievement scores are below norm, and if the child does not receive special attention, he or she will fall short in ability during the remaining school years. Practice with familiar books is critical according to this model. It is noted that children of low SES show a widening of the reading ability gap particularly at this stage. "The child whose parents cannot afford to buy books or whose own patterns of recreation and work do not include borrowing books and magazines from a public library loses needed time for practice."

Stage 3. Reading for Learning the New-From One Viewpoint (Grades 4-8)

Children begin to read for knowledge or information. They recognize that reading materials provide insights about the world. There is a progression from finding it easier to learn from listening or watching, to a point at which reading is recognized as at least an equal to other means of knowledge acquisition.

We would add to this that it is during stages 3 that reading for entertainment becomes important.

To the extent that the preceding model is at all valid, a child's location in the reading development progression, typically located by age, has important implications for how he or she will score on a variety of reading measures. It is also clear that the home environment, in terms of the value attached to reading as an activity and as a way of learning can be a powerful influence in the acquisition of reading skills. If the home environment encourages and enhances reading activities, the child has a better chance of progressing trouble-free through the first three stages. On the other hand, if the home environment has few facilitating mechanisms for reading development, and if it stresses television as the means for entertainment, activity, interaction, and information acquisition, then the child's reading development may be impeded. Moreover, the model implies a more important influence of the home environment among younger children--up to approximately age nine. After that age, the basic skills are fairly well implanted, and we would expect to see more individual differences emerging in the use of reading for information acquisition. It is worth noting here, that although some of the most dramatic changes in orientations toward print and television occur prior to age nine, most studies of reading and television viewing tend to focus on children older than age nine.

In our view then, age is an important variable in the study of televiewing and reading, and the younger the children included in the study, the higher the probability that effects of home environment and television viewing on reading behavior will appear.

The following describes our attempts to work with children as young as seven years and to develop measures of television behavior, reading

behavior, and home environment that are somewhat more elaborate than the measures typically reported in the literature.

Method

Sample selection and questionnaire administration. Today's report presents initial findings from the first year of a planned three-year panel survey we are conducting in Northern California. Nine schools from four different geographical locations were selected to provide a cross section of children in terms of family socioeconomic status, location in urban and rural settings, and racial and ethnic mix. Approximately one third of our sample comes from the general area of the San Francisco Peninsula, and two thirds from the Greater Sacramento area and rural environs.

In the spring of 1981, 580 second, third, and sixth grade children kept seven-day television viewing logs and then completed an extensive survey questionnaire containing a wide range of items about family environment, television and reading habits, school behavior, and so forth. Sixth grade children responded to the questionnaire in the classroom setting, with one survey administrator reading the items and responses aloud, and several aides providing assistance when necessary. These older children completed the questionnaire in a single, hour-long session. Second and third graders completed the questionnaire in either two or three sessions ranging from thirty to forty minutes each, conducted on consecutive days. The questionnaire was administered to them in groups ranging from three to eight children, with one administrator for each group. There was usually an aid fluent in Spanish available to assist any of the several Spanish language children in all grades in the sample.

The General Model and Scales. We would like to begin this discussion with a general model that represents each of the constructs we want to consider. Figure 1 presents that model. Lest we mislead you by beginning with a model containing labeled constructs and directional arrows, several caveats are in order. First, we find it convenient to discuss the two paths depicted in Figure 1 by moving from left to right, but we wish to stress that at this point, we do not consider this to be a strict causal ordering. Second, we want to make clear that although the constructs we present here represent many of the ideas and hypotheses with which we began, the final form of this model and the scales making up each construct also represent a process of interaction with the data. Finally, you need to be aware that the constructs presented in Figure 1 take several different forms, ranging from a single item, to a single scale composed of a number of items, to a standardized scale (cf. Allen & Yen, 1979, for a discussion of standardizing scores and scales)made by combining several sub-scales, or several independent scales each of which represents a separate, independent dimension of the same construct. In this latter case, then, analyses are never conducted for the construct as a whole; rather, independent analyses were conducted for each dimension of the general construct. We will comment more on this when we discuss the appropriate scales.

The items used in the scales representing the various constructs are the result of our initial reasoning concerning the nature of each of the dimensions, and then tested empirically through the use of factor analysis and reliability tests, both of which were used to eliminate items. Subscales were combined when they appeared to measure a similar dimension and were highly correlated. The result, we believe, is a first pass at the measurement of a set of constructs that have both a theoretical and an empirical basis.

Insert Figure 1 About Here

As Figure 1 indicates, we began with a general hypothesis that the factors which might influence reading achievement operate through one of two major paths--one of which moves via constructs related to the print medium, one of which moves via constructs related to television. Again with the caveat that any imputation of strict causality awaits the test of Wave II data, we will track the model from left to right.

Socio-Economic Status. Given the consistent finding that socio-economic status (SES) is negatively related to the amount of children's televiewing (Comstock, et al, 1978), and positively related to their print use (Roberts & Bachen, 1981), as well as the obvious fact that SES will influence the home availability of both print and broadcast media, we began with a measure of socio-economic status. We must qualify this measure emphasizing that it is a somewhat more indirect estimate than those that are often used in studies of this type. Since we were unable to get SES data from the children,we asked school principals to assess the income levels of the constituent neighborhoods feeding into each school as lower, lower-middle, middle, upper-middle, and upper class. On the basis of these estimates we classed schools as lower-middle, middle, or upper-middle class, and all children from that school were so designated. Each of the lower-middle and middle class levels is represented by one of the Bay Area schools and at least two of the Sacramento area schools. Unfortunately, the upper-middle class portion of the sample is represented by a single, Bay Area school. Despite the problems with this measure, we felt it was worth including. We intend to obtain parental reports of SES in the second wave data collection, and will be able to compare the degree to which the present approach reflects more direct measures.

Home Environment: Reading and Television. Children encounter the media within the physical and social environment of the home. We hypothesized that the degree to which various media are available within the home, and the attitudes or behaviors that family members express toward each of the media, would influence how the developing child uses both print and television. The two Home Environment constructs, then, attempt to assess both media availability and family media behavior.

All but three children in each grade came from homes with working television sets, hence, presence or absence of a TV did not discriminate among children. Rather, the television availability dimension is represented by a measure of "constant television," the extent to which the TV set is "on" throughout the day (Medrich, 1979). The TV home environment media behavior scale is a combination of four sub-scales. First, there were items measuring parental television behavior and parental control of the child's televiewing. These include such things as the presence or absence of restrictive TV rules (e.g., some shows are forbidden), and the presence or absence of conditional TV rules (e.g., viewing is conditional upon completion of homework or chores). A third component of the TV home environment scale is a set of items assessing amount of parent-child interaction surrounding television (e.g., do parents view or discuss television shows with their children?) A final set of items taps parental attitudes toward television (e.g., children's perceptions of whether parents are negative toward the medium). High intercorrelations among these sub-scales led us to combine them into a single standardized scale. Thus, the TV Home Environment construct is represented by two dimensions: one a measure of Constant Television; one a measure of TV Family Media Behavior.

The Reading Home Environment, on the other hand, is captured in a single scale composed of two sub-scales. The first is a straightforward measure of print availability in the home, based on items asking about whether there is a newspaper subscribed to, magazines subscribed to, magazine subscribed to for the child, and whether the parents read books daily. The second sub-scale includes items about attitudes toward the child's reading (e.g., does the parent encourage the child to read rather than watch TV?) The high intercorrelation between the two subscales convinced us that they should be combined into a single standardized scale. Thus, the Home Reading Environment is represented by a single score.

Amount of Television Viewing and Reading. The next two constructs along the two paths of our general model represent the amount of time children spend with each of the two media, clearly an important consideration in any kind of explanation for the relationship between television and reading.

The measure of Amount of Television viewing is derived from responses to three items: how much time children spend watching TV before school, after school (afternoons), and in the evenings. Younger children were given additional boundaries during the interviewing sessions to help them more accurately estimate their televiewing time (e.g., the hour the child gets up in the morning, whether there is viewing during breakfast, etc.). In order to normalize the distribution resulting from combining responses to these three items, the scale was collapsed into two-hour intervals (with any responses indicating more than 12 hours of viewing combined into one final interval). This measure of Amount of Television Viewing correlated well with such other TV viewing measures as the child's estimate of total viewing hours on an average day, or the number of days per week

the child viewed. It seems that by breaking the day down into smaller units we were able to elicit more accurate information from the children. The final test of this approach will be made when we compare the results of this measure with data from the daily television log.

The task of having children estimate the amount of time they spend watching television each day pales beside the parallel task of asking them to estimate the amount to time spent reading each day. Not only is it unlikely that children will be aware of how much time they spend at that activity, and not only do books lack the "program units" that assist estimation of television time, but time estimates across children are not comparable. That is, even within age levels some children read faster than others, and we are not yet ready to address the question of whether reading rate and amount of material covered inhabit similar conceptual domains. Moreover, given that we are dealing with children of different ages, even asking the number of books read during some period remains ambiguous since a third grader could go through five books suitable for his or her age level in the time it takes a sixth grader to complete one. This reasoning and a good deal of pilot testing convinced us to construct a measure of Amount of Reading on the basis of frequency of reading as a "daily" activity.

The resulting Amount of Reading Scale, then, is based on the sum of two sub-scales and one additional item: (1) the child's response to each of three items asking if he normally reads before school, after school, and in the evenings; (2) the child's estimate of the number of days in a week he reads a non-school book, a magazine, or comics; (3) the child's report or whether or not he has read a non-school book in the past two

weeks. The two sub-scales were standardized, and all three components were summed to obtain an Amount of Reading score.

Orientations Toward Television and Reading. The next two constructs attempt to capture children's general orientations toward both television and reading. Our interest begins with the conventional uses and gratifications approach, but goes beyond that, by attempting to combine reasons for viewing or reading with the child's perceptions of the demands of each medium in terms of use. For example, a child may state that a reason for viewing is to learn things, but that response fails to include how the child actually sees his or her ability to learn from TV.

Both the Reading and Television Orientation constructs are made up of three independent scales, one of which we have called a Learning Orientation, second of which is a Pleasure/Attachment Orientation, and the third of which is an Escape/Default Orientation. Each scale begins with the results of a factor analysis performed on children's estimates of how much each of sixteen different reasons for viewing television or for reading represented their own motives. Additional items that logically fit with and broadened the scope of the obtained use dimensions were then added to each factor to make a more conceptually complex scale.

The Learning Orientation scale contains such conventional "use" items as "I read to learn about new places," "I read to learn new things for school," and so on. The second component of this scale is derived from Solomon's (in press) AIME scale, which assess the amount of mental effort children perceive themselves as having to invest in each medium in order to learn about different topics. Finally, the Learning Orientation Scale for the Reading Construct only includes an estimate of the child's

perceptions of his or her own reading ability. The Learning Orientation Scales, then, generally assess whether and with what degree of perceived success children orient toward both print and TV in order to Learn.

The second Orientation scale, Pleasure/Attachment, is composed of items from the uses and gratifications analysis that indicated the children use each medium for fun and excitement, in combination with responses to a set of questions asking about preferences for reading or television viewing over other activities, (e.g., TV vs. playing with friends, reading vs. going with parents to visit someone). We found that children who indicated that their main reason for using each medium was pleasure, were also the most likely to choose that medium over other potentially pleasurable activities. In a sense, they were strongly attached to the medium.

Finally, the Escape/Default Orientation scale is based solely on the factor analysis of use items. It is composed of responses indicating that each medium is used to escape from other activities (e.g., I read/view to forget school; to get away from the family; etc.) and of items that imply that reading or television are used as a default options (I read when there is nothing better to do; I watch because I am bored).

These three Orientations--Learning, Pleasure/Attachment, and Escape/Default--are <u>not</u> combined into a single scale. Rather, they are approached as independent dimensions within the Orientation construct, and the influence on reading achievement of each dimension is looked at separately.

<u>Involvement With Television and Reading</u>. As with the Orientation constructs, these two additional constructs also contain several separate scales. Television Involvement is composed of three independent items. The first scale combines several items designed to tap the children's degree of involvement

with the medium (e.g., does the child report getting bored while watching television; does the child play with toys while watching television, etc.). The second scale attempts to assess another kind of involvement, more cognitive in nature. It is comprised of items asking about the degree to which children put themselves in the place of characters in a story, feel or express emotions toward those characters, attempt to guess the end of the story, and so on. The third scale represents the number of times the child chooses television over books when asked from which medium he or she would rather learn about nine different topics (e.g., a new invention, a family in New York, how a jet engine works). Finally, the fourth item reflects the child's choice of television over books when asked from which medium they generally learn the most.

The Reading Involvement construct contains two scales, and a single item. One is simply the number of times children choose books over television when asked which medium they would choose to learn about the different topics noted above. The second includes items measuring children's perceptions of reading as boring, as difficult, and as only necessary for school. The third item reflects the choice of books over TV as the medium from which one can learn the most.

As with the Orientation construct, the scales or items in the Involvement construct were not combined into a single scale.

Reading Achievement. Finally we come to the criterion measure, Reading Achievement. All but two schools in our sample used the California Test of Basic Skills (CTBS). Of the remaining two schools, one used the Science Research Associates (SRA) series test, and the other used the Stanford Achievement Test (SAT). Given the use of different tests, we computed the distribution of percentage of correct answers for each test. We then compared the distributions of the two alternative tests (the SRA

and the SAT) to distributions obtained with similar schools (in terms of SES background) using the CTBS. No real differences in the distributions were noted. Therefore, the reading achievement score used in this study is simply the percentage of correct answers on each of the respective tests.

Summary. To sum up, then, our model represents a set of conceptual units which we believe should influence, either directly or indirectly, reading achievement. We used straightforward correlational analyses, factor analyses, and reliability tests to determine whether there was empirical support for our conceptual groupings. Some items were omitted due to multicollinearity, others because they simply did not contribute to the dimension we were attempting to measure. The general model which emerged from this process is characterized by two routes to reading achievement. One is via the Television Environment,and it's associated amounts of Viewing, Orientations, and Involvement; the second is via a parallel sequence of Reading Environment, Amounts, Orientations and Involvement.

The next step was to examine how these various constructs related to Reading Achievement.

Results

The bivariate relationship between amount of television viewing and reading achievement for the combined sample of second, third, and sixth grade children replicated the now familiar finding of a modest, negative relationship ($r = -.23$, $p < .001$). When the same relationship was computed for each individual grade, the correlations remained moderately negative and statistically significant. However, there also emerged a relatively wide range in the magnitude of the relationship. Table 1 presents the correlation coefficients for Amount of Television Viewing and Reading Achievement by grade, as well as the bivariate relationships

between each of the other predictor variables developed for this study and Reading Achievement. The between grade variance in the magnitude of the obtained correlation coefficients confirmed our original decision to conduct separate analyses for children at each of the three grade levels.

Insert Table 1 About Here

Our next step was to perform multiple regression analyses in which scores from each of the constructs discussed in the preceding section were used to predict reading achievement. For each of the three grades, the analyses were performed separately for constructs in the reading sequence, for constructs in the television sequence, and for the combined reading and television constructs. Each construct was entered into the model in the order in which it appears in Figure 1. In those instances where the predictor construct is represented by more than one dimension (e.g., each Orientation construct contains several scales), the measures were entered simultaneously as a block. We again emphasize that we are not presenting this general model as reflecting a causal order. Rather, it serves as a theoretical structure which seems to explain the optimal amount of variance given our measures from a single data collection.

None of the three regression analyses performed on the second grade sub-sample accounted for a significant amount of variance in reading achievement scores. All three models (Reading, Television, and Reading and Television Combined) accounted for significant amounts of variance in reading achievement at both the third and sixth grade levels.

Among third graders, the Reading Construct sequence accounted for 39% of the variance, the Television Construct sequence accounted for 41%

of the variance, and the Combined sequences accounted for 59% of the variance, all with significant F values (for the equation) at well beyond $p < .001$. Table 2 summarizes the regression analysis for the combined sequences for the third grade. It is clear that socioeconomic status and what we have labeled Orientation toward the media account for the lion's share of the variance, with SES contributing 19% and Orientation 20%. The predictive power of the Orientation construct is worth comment given that 32% of the total variance was removed before the Orientation Construct was entered. The Home Environment Construct also accounted for a significant change in the r square statistic (10% of the variance). The Involvement Construct contributed only 7% of the r square change, but it was entered into the equation last. Finally, Amount of Use contributed very little (3%) to the variance in reading achievement scores, supporting our original skepticism about the degree to which single dimension measures of amount would predict reading.

Insert Table 2 About Here

When the three regression models were computed for the sixth grade sample, the Reading Construct sequence accounted for 17% of the variance in reading achievement, the Television Construct sequence for 19% of the variance, and the Combined sequences for 29%. Table 3 summarizes the regression analysis for the combined sequences for sixth graders. Here the pattern is quite different from that found for the third graders. Socioeconomic status accounted for very little of the variance in reading scores (1%). The Home Environment construct produced a change in the r square statistic of 5%, not enough to reach statistical significance.

Amount of use accounted for 7% of the variance in the reading achievement scores, a highly significant increment. As with third graders, the Orientation Construct again accounted for the largest change in the r square statistic; it accounted for 11% of the variance in reading achievement among sixth graders. Finally, the Involvement added another 6% to the variance accounted for, not enough of a change to reacn statistical significance, but given its position in the equation, certainly enough for the construct to warrant further examination.

Insert Table 3 About Here

It is clear that the model is much more successful at predicting the third graders' reading achievement levels than the sixth grade levels: 59% of the variance was explained at the third grade vs. only 29% at the sixth grade. Much of this difference comes from the contribution made by SES and Home Environment for the third graders (collectively, 29% vs. 6%). Additionally, the Orientation construct is stronger (20% vs. 11%) among third graders. Only Amount of Use at the sixth grade level explains more variance than the comparable construct for the third graders (7% vs. 3%).

In terms of reading development theory, we were not surprised to see the strong impact of SES and the Home Environment construct on the third grade children. As reported earlier, Chall (1979) has pointed to the importance of socio-economic status in early reading development in that SES locates both the economic means and the value systems influential in supporting the reading activity. It appears that, during the period that basic skills are still crystalizing,the facilitating effects of the environment for preparing the child for more formalized reading instruction have a

significant effect on reading achievement.

At the sixth grade level, Amount of use is notable. This, too, corresponds with the picture of the developing child where patterns of use become more clearly defined as a result of the child's own interests and abilities. At this point, the child begins to operate as an independent agent in terms of acting in a more self-motivated way, and also having more access to television and to reading-related facilities. For example, sixth graders were more likely to have a TV in their own bedroom (33 %) vs. the second or third graders (23 % and 27% respectively) Since at the sixth grade level, the bulk of the formal, skills-related instruction is complete, we would no longer expect to see the facilitating role of SES or home environment, but rather expect behaviors and attitudes more closely related and central to the child to be important.

The non-uniform influence of each construct, as well as the differences between grades led us to explore the relationships between the constructs further using a path analytic technique. We assumed the ordering among variables presented in Figure 1, but again emphasize that this ordering is not tied tightly to any theory or pre-existing work. Still, we believe that the ordering presented has some theoretical merit, certainly enough to warrant a secondary exploratory analysis of the model.

Socioeconomic status functions as the primary exogenous variable, for it embodies general, stable family characteristics. The Reading and Television Home Environments follow as secondary, family-level antecedent variables, characterizing the home environment in terms of which media are available, and what parental attitudes and behavioral are like in relation to these media. These three constructs can influence a child's Amount of reading or viewing insofar as these behaviors are affected by the

presence of various media, and encouragement or restrictions placed on them.

The Orientation and Involvement constructs follows Amount of Use, and serve as possible mediators between Amount and Reading Achievement. We are not ready to argue that Orientation should precede Involvement, or vice-versa. Therefore, in our analyses we deal with either a dimension from one construct or the other, but never both. Thus, none of the analyses attempt to include all the constructs in the model. Each contains the SES, Home Environment, Amount of Use, and Reading Achievement constructs, but seeks to clarify or explore only <u>one</u> of the mediating dimensions of Involvement or Orientation,

Although we feel that this sequence of constructs is intuitively valid and reflects existing theory, we acknowledge the possibility of non-recursivity. That is, it is possible to argue that the link between Amount of Use and Orientation or Involvement may be bi-directional (i.e., Amount leads to a certain Orientation or level of Involvement, but that Orientation or Involvement may also influence Amount). For these exploratory purposes, we analyze the model as a recursive one according to the original sequence. However, in future analyses of these data, we will apply some non-recursive analytic techniques to see if we obtain different results when we allow for a bi-directional influence between constructs.

The next series of analyses presented then, are based on a path analysis of a subset of the constructs and dimensions included in the total regression model. The links between constructs are represented by beta weights, or standardized regression coefficients. In path analysis generally, there is no well-defined criterion for establishing the minimal strength of a beta for reporting purposes. Given the exploratory nature of the present analysis, we decided to report only those betas greater than .15, in an effort to make the model as "clean" as possible. From the point of view of

both statistical significance and theoretical "meaningfulness". (Cf. Kerlinger and Pedhazur, 1973, pp. 317-318).

We begin with an analysis of the SES, Home Environment, Amount of Use, Read-to-Learn Orientation and Reading Achievement constructs for the third grade. As the pattern of beta weights in Figure 2 indicates, we can see that the reading sequence is far more important in determining Reading Achievement (i.e., the Reading Environment, Amount of Reading, the "Read-to-Learn" Orientation all influence on Achievement independently). Additionally, there is a strong indirect path from SES through Reading Environment, Amount, and Read-to-Learn, to Achievement. SES has the strongest direct effect on Achievement (.42), and is also strong in its influence on Reading Environment (.35), but it has no impact on the television sequence. Viewing TV-to-Learn is the only influential TV dimension (-.32); the effect of Amount of viewing is absorbed by this variable in its effect on Reading Achievement.

Figure 2 About Here

We might expect that the "View to Learn" is mediating the effect of Amount of viewing by locating children who are at a developmental stage where they are still heavily dependent on TV (as well as other non-print sources) as a way to learn new things. The child who says he or she relies on television as a way to learn may be having difficulty with the transition identified by Chall (1979) of moving from the visual and auditory sources of learning to learning from books. This continued orientation toward learning from TV may then impede the reading performance of the child. Along these lines, it is interesting to note that the magnitude of the effect of Amount of viewing on Viewing-to-Learn (.16) and on Reading-to-Learn (-.18)

is about the same; the only difference lies in the direction of the effect.

Moving to the sixth grade analysis of these same constructs, Figure 3 presents the obtained results. Once again, the reading variables have the greatest effect in predicting Reading Achievement. Reading Environment, Amount of Reading, and Read-to-Learn Orientation all influence Achievement directly. The indirect path from SES through Reading Environment, Amount of Reading, and the Read-to-Learn Orientation parallels the third grade finding in its strength. For sixth graders, SES does have an influence on the reading sequence through its moderate effect on Environment. Stronger, however, is its effect on Amount of Viewing, and to some extent on the View-to-Learn Orientation. In contrast to the third grade results, Amount of Viewing has a direct, negative effect on Achievement, and although it is strongly related to the View-to-Learn Orientation, the path between View-to-Learn and Achievement is not significant. Finally, the presence of the critical TV environment (which, it should be recalled, includes a somewhat critical family orientation toward the medium) has a moderately strong influence (.22) on the Amount of reading a child does.

Insert Figure 3 About Here

These combined findings amplify some of the regression analyses presented earlier. Here we can see clearly the direct impact of socio-economic status on Reading Achievement at the third grade level. Among sixth graders, the strongest influences on Achievement come from the Amount of Reading and the Read-to-Learn Orientation. It seems that although the background characteristic of SES is critical for third grade achievement, the more child-centered constructs of Amount of Use and Read-to-Learn

Orientation are stronger at the sixth grade level. The path from SES to Amount of viewing, and then to Reading Achievement is unique to the sixth grade. As previously mentioned, the effect of SES on TV viewing becomes apparent with age, which may explain the difference between the third and sixth graders in this construct. One might speculate that for these older children, the SES - Amount of Viewing-Achievement path locates an enduring tendency for certain kinds of viewing patterns, including a high level of TV viewing, and further, that this tendency might displace available time for practicing the now-developed reading skills.

The second dimension we will explore here is the Default/Escape Orientation of television. We were interested in seeing whether the child who used TV to "escape" from family or school concerns, or who used television for lack of anything better to do, would score lower on Reading Achievement. The model for the third graders is presented in Figure 4.

Insert Figure 4 About Here

Of particular interest here are the television relationships. We find Amount of television viewed strongly related to the Escape/Default Orientation, and further, that Escape/Default has a strong negative influence on Achievement. From the beta coefficients, it is clear that although Amount of viewing itself is a negative predictor of Achievement (-.20), the stronger influence comes through the Escape/Default Orientation (-.26). The reading paths remain the stronger predictors as before. In this model, however,we can see that Amount of Reading is negatively related to the Escape/Default Orientation (-.19). It appears that these reading and viewing dimensions are at cross purposes with each other, (although Amount of reading alone at this level is not a significant predictor of Achievement (.11)).

Moving now to the sixth grade model, we obtained the following paths shown in Figure 5. The pattern of effects again changes. Although Amount of viewing and the Escape Orientation are strongly related (.27), the Escape/Default Orientation does not, itself, add significantly to the prediction of Achievement. Amount of viewing alone has the strongest impact (-.28). As with the third grade results, Amount of reading is negatively related to the Escape/Default Orientation (-.32). Amount of reading and the Reading Environment once again are good predictors of Achievement (.29 and .22 respectively).

Insert Figure 5 About Here

The final dimension which we have chosen to explore is the influence of one of the Involvement dimensions: the extent to which the child is actively, cognitively involved with the process of television viewing. (Recall that this dimension was measured by questions about whether the child identified with characters in TV programs, guessed the ending of stories, etc). Our purpose in including this dimension was to see if cognitive involvement with TV could actually be a positive influence on Achievement, in that some of the cognitive processes and demands engaged when watching TV actively, might be similar to those engaged when reading. Figure 6 presents the third grade model.

Insert Figure 6 About Here

From the standardized regression coefficients, we can see that for the third graders, cognitive involvement with TV does not affect achievement. The TV Environment is strongly related to Cognitive Involvement, which is

not surprising given that a critical TV Environment may be influential in teaching the child to apply critical skills in the actual viewing situation. Still, we find that Television Environment has a negative impact on Achievement (-.16). We conclude from this that for the third graders, at least, our ideas about the parallel operation of critical skills was not borne out.

Looking at the same set of constructs within the sixth grade population, we obtain the results presented in Figure 7. Here, we find a different effect for cognitive involvement; namely, cognitive involvement does have a positive, independent impact on Reading Achievement (.18). Amount of viewing continues to have a strong negative effect on Reading Achievement (-.26), and does so without any relation to Cognitive Involvement. Amount of reading is positively related to cognitive Involvement (.19), which supports our notion that reading and active cognitive involvement with TV may engage complementary cognitive operations. No other constructs are related to Cognitive Involvement.

Insert Figure 7 About Here

The fact that the Cognitive Involvement effect appears at the sixth grade, but not the third grade is very likely due to the "meta-cognitive" nature of the dimension. That is, some of the variables comprising the Cognitive Involvement dimension asked whether the child takes the place of a TV character, or projects outside the immediate, concrete situation of viewing a program to guess how the story might end. Such role-taking and projection tasks require higher level, "meta-cognitive" skills which the younger children probably have not fully developed, hence, would not be

adequately represented by this dimension. (cf. Flavell, 1977 for a complete discussion of cognitive development stages).

There are a few contrasts between the models that are worth noting. Between the third grade models of View or Read-to-Learn and Escape/Default, we find a difference in the television sequence constructs in that the direct path between Amount of TV and Achievement drops out in the View-to-Learn models but remains a moderate influence in the Escape/Default Model (.20). We suggest that this is due to the particular influence of the View-to-Learn dimension alluded to earlier, in locating that transition in reading development from learning through non-print sources to learning through print. At this stage, the Orientation, rather than Amount, may be the critical factor. That is, a reliance or dependence on the television medium for learning, to the exclusion of the development of a reliance on print for learning, may locate a critical point through which, if a child does not advance, later reading abilities are impeded. More than Amount of viewing, then, at this age (third grade) we might look at the establishment of the Orientation to use one medium or another for the purposes of learning. This line of thinking is consistent with the sixth grade finding that there is no direct effect between View-to-Learn and Achievement. Instead, the effect is directly through Amount of use.

At the sixth grade level, both the View-to-Learn and Escape/Default Orientations are embedded in a path of SES $\longrightarrow$ Amount of Viewing $\rightarrow$ Orientation. The betas between SES and Amount of viewing are -.31 for each dimension. The beta for Amount of Viewing and Escape/Default is .27, and the beta for Amount of viewing and View-to-Learn is .30. Neither orientation has a path which continues to Achievement, but the effect of Amount of Achievement changes dramatically for each Orientation. The beta for Amount of Achievement

is .19 in the View-to-Learn model, whereas in the Escape/Default model it is .28. This may mean that having a View-to-Learn Orientation at the sixth grade level actually mitigates against the negative effect of amount of viewing generally, even though on its own, the orientation does not have a notable effect with Reading Achievement.

Between the third and sixth grades, in general, we can say that the influence of amount of viewing on achievement is more strongly seen at the third grade level when it is mediated through other television related dimensions. On the other hand, at the sixth grade level, amount of viewing, although related to other variables, is strongest in its direct influence upon Achievement.

What can be concluded from these three exploratory path analyses? First, in all cases, they show the superior ability of the reading sequence to predict reading achievement. Clearly, at both grade levels, the background construct of Environment, as well as the individual child characteristics of Amount of Reading and Orientation toward reading, make independent and combined contributions to the variance in Reading Achievement. Reading Abilities, as measured by Reading Achievement tests, are dependent upon far more than just the formal instruction offered by the schools.

Second, these path analyses demonstrate that certain Orientations toward reading or television can augment the effects of the Amount of reading or viewing a child does. For example, the Read-to-Learn dimension at the third and sixth grade levels, the Escape/Default dimension at the third grade level, and the View-to-Learn dimension at the third grade level, all boosted the effect of Amount of either reading or television. This takes us back to our original point that amount of viewing and amount of reading, although important variables in their own right, are but parts of a larger complex of related television or reading constructs.

Third, we found that it is possible to locate an Orientation within the television sequence which positively predicts Reading Achievement. At the sixth grade level, Cognitive Involvement with television actually seems to represent skills that parallel those necessary for good reading performance.

Finally, we discovered that the differences between the grade levels are predictable, and can be explained through reading development theory and general cognitive development theory. With Wave II data, we will be able to test these differences further and, we hope, ground our interpretations more solidly.

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FOOTNOTES

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TABLE 1

BIVARIATE CORRELATIONS BETWEEN PREDICTOR CONSTRUCTS AND READING ACHIEVEMENT SOCRES FOR SECOND, THIRD, AND SIXTH GRADE CHILDREN

Predictor Construct	Second Grade	Third Grade	Sixth Grade
SES	.01	.44 ***	.05
Home Environment			
Constant Television	.02	-.22 ***	-.14 *
TV Family Attitudes	- .003	-.06	.13 *
Reading Environment	.04	.31 ***	.28 ***
Amount of Use			
TV Viewing	-.15 *	-.35 ***	-.21 ***
Reading	-.08	.05	.24 ***
Orientations			
TV Learning	-.08	-.22 **	-.08
TV Pleasure/Attachment	.01	-13 *	15 *
TV Escape/Default	-.11	-.28 ***	-.03
Read Learning	.15 *	.19 **	.34 ***
Read Pleasure/Attachment	-.14 *	.24 ***	.28 ***
Read Escape/Default	-.07	-.04	.06
Involvement			
TV Involvement #1 (attentional)	-.06	.11	.22 ***
TV Involvement #2 (cognitive)	-.09	.06	.19 **
TV as Preferred Source	.004	-.22 **	-.21 ***
Reading as Preferred Source	.004	.22 **	.21 ***
Reading Difficult	-.12	-.33 ***	-.20 ***
General Preference for LRN from TV/Read	-.12	-.20 **	-.17 **

LEGEND: * $p < .05$
** $p < .01$
*** $p < .001$

TABLE 2

MULTIPLE REGRESSION SUMMARY FOR THIRD GRADERS

Combined Reading and Television Constructs

Predictor	Multiple R	R squared	F	p	rsq change	F change	p
SES	.43	.19	18.19	.001	.19	18.19	.001
Home Environment	.54	.29	7.79	.001	.10	3.70	.01
Amount of Use	.57	.32	5.88	.001	.03	1.75	ns
Orientation	.73	.53	5.25	.001	.20	3.56	.01
Involvement	.77	.59	4.67	.001	.07	1.97	ns

TABLE 3

MULTIPLE REGRESSION SUMMARY FOR SIXTH GRADERS

Combined Reading and Television Constructs

Predictor	Multiple R	R squared	F	p	rsq change	F change	p
SES	.07	.01	.68	ns	.01	.68	ns
Home Environment	.24	.06	2.08	ns	.05	2.53	ns
Amount of Use	.36	.13	3.35	.01	.07	5.61	.005
Orientation	.49	.24	2.87	.001	.11	2.32	.05
Involvement	.54	.29	2.71	.001	.06	1.96	ns

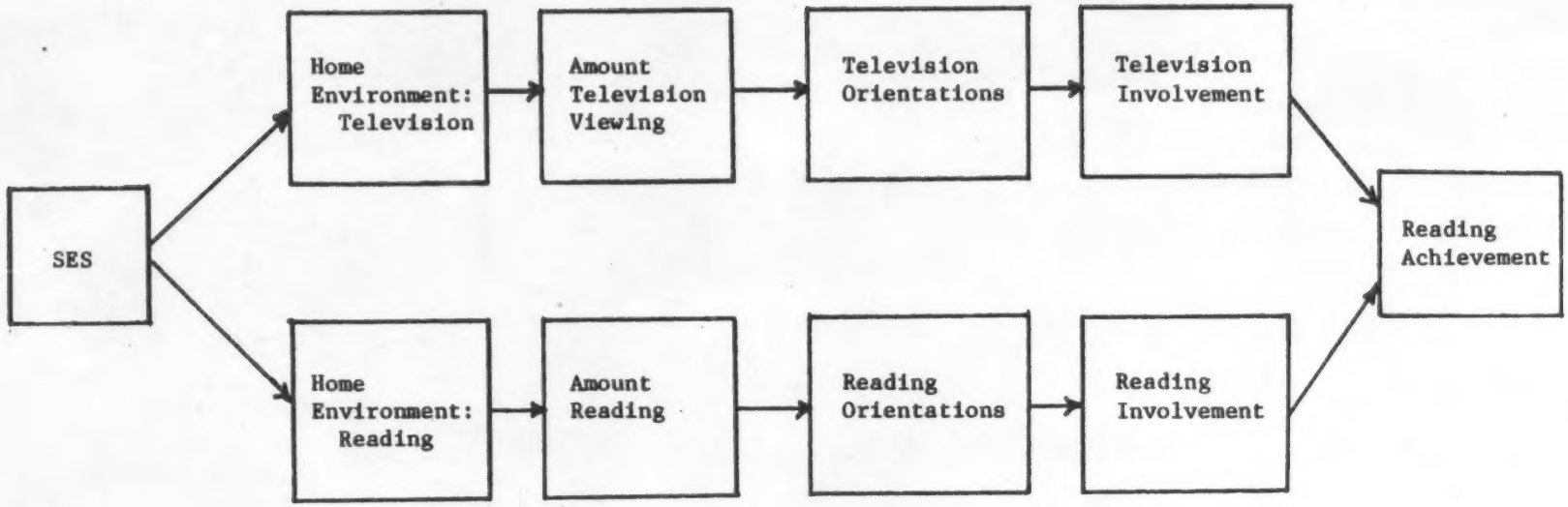

Fig. 1. General model of Television related constructs and Reading related constructs presumed to influence Reading Achievement.

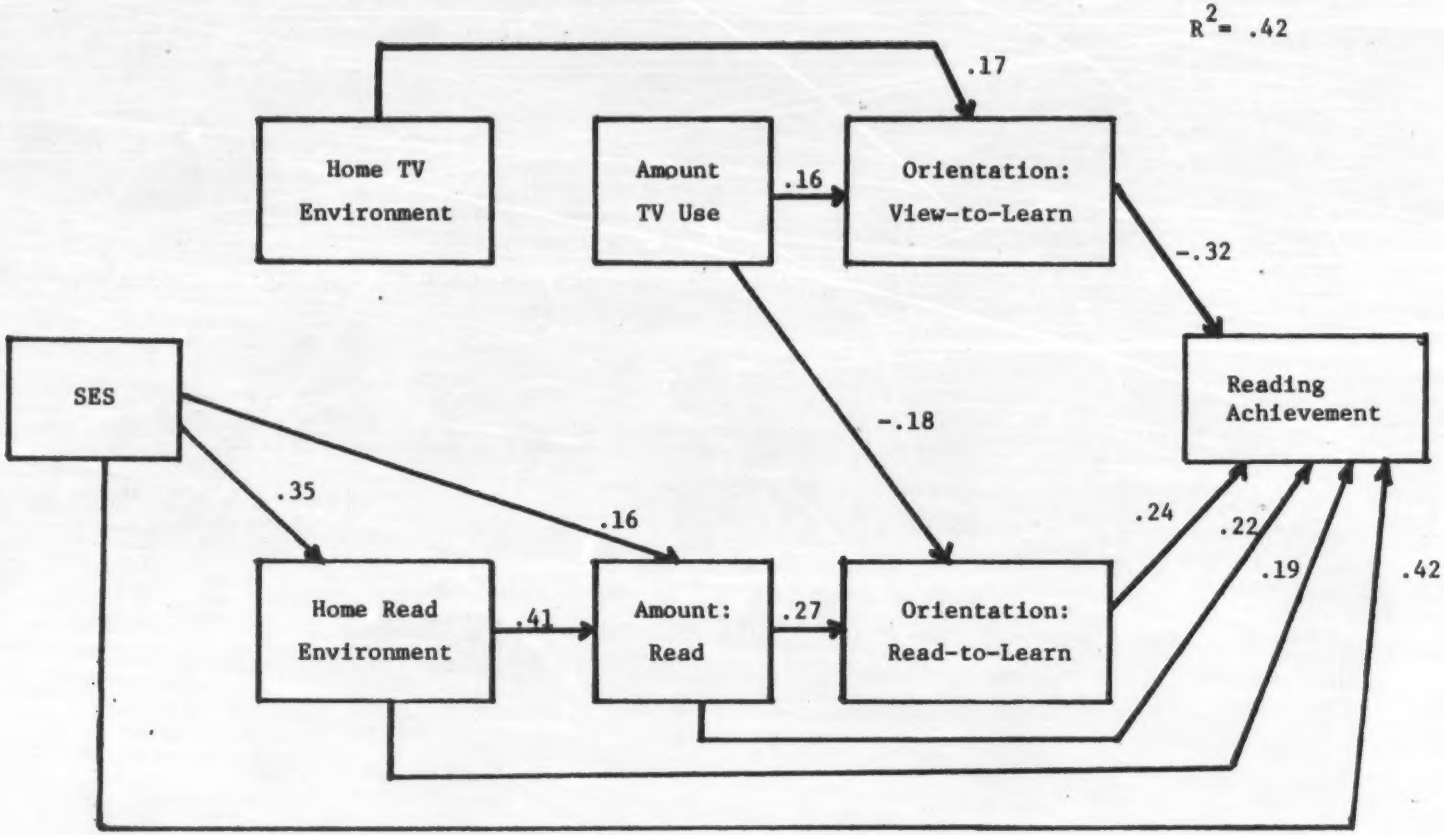

Figure 2. Path analysis of SES, Home Environment, Amount of Use, Read/View-to-Learn Orientation and Reading Achievement for Third Grade Children.

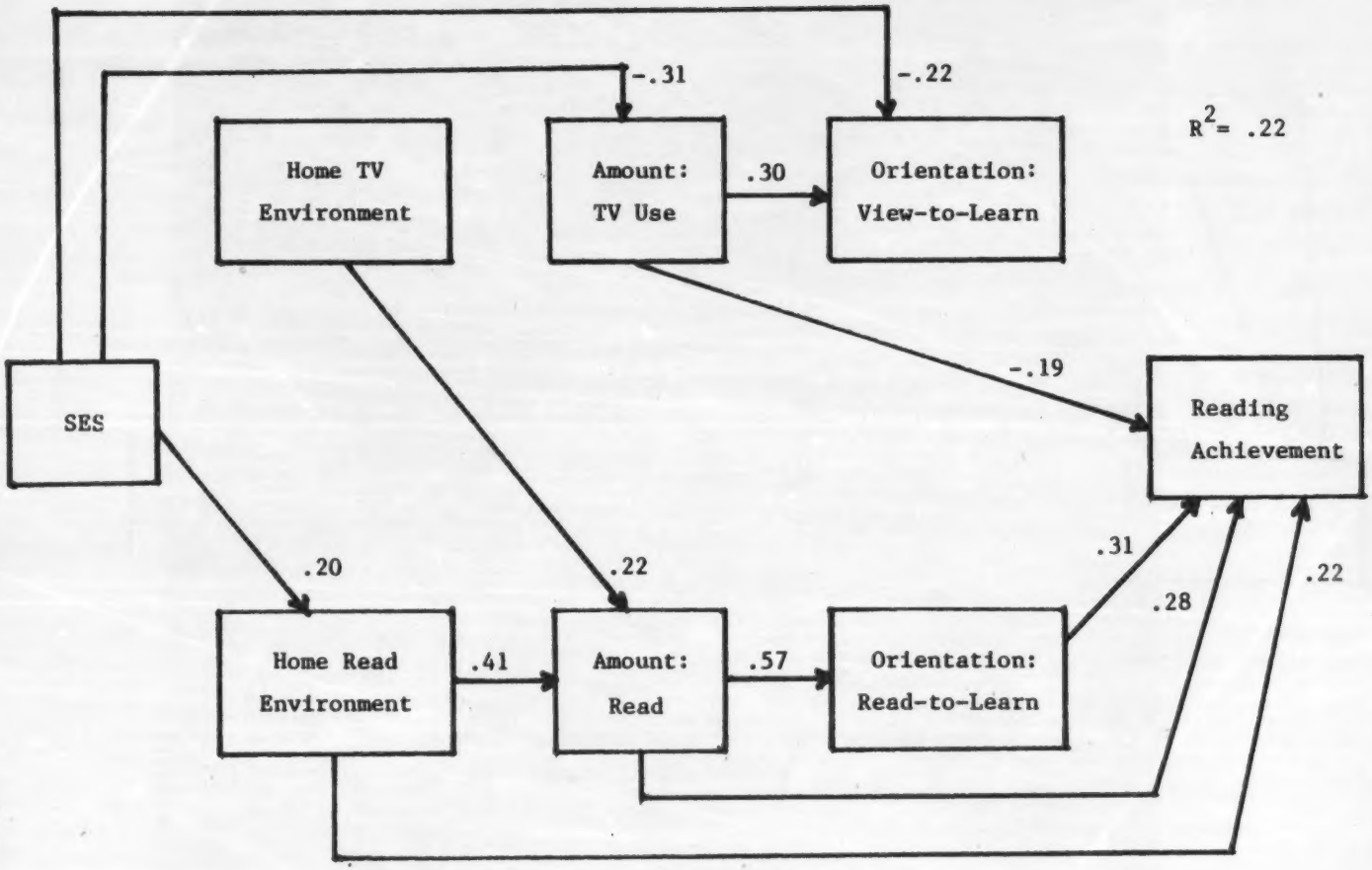

Figure 3. Path analysis of SES, Home Environment, Amount of Use, Read/View-to-Learn Orientation and Reading Achievement for Sixth Grade Children.

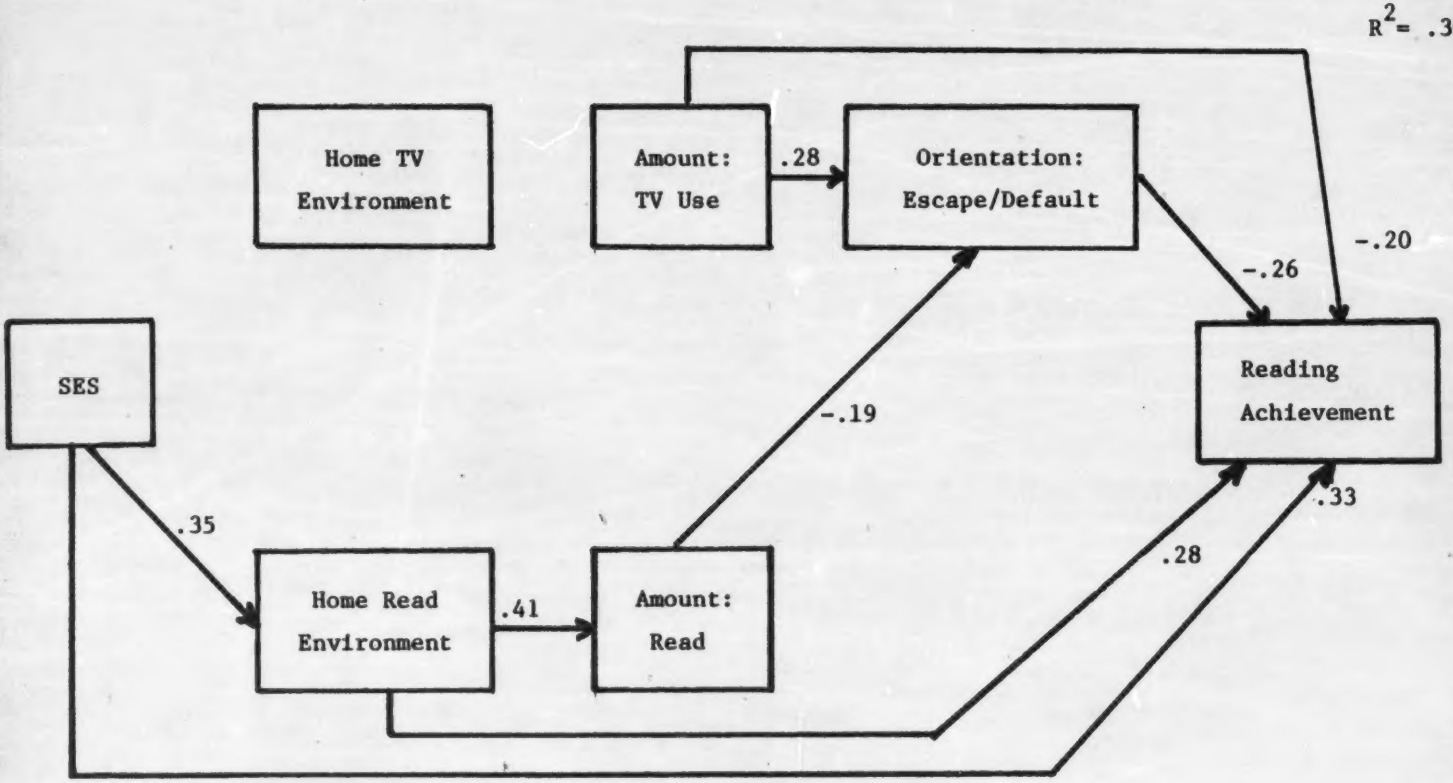

Figure 4. Path analysis of SES, Home Environment, Amount of Use, Escape/Default TV Orientation and Reading Achievement for Third Grade Children.

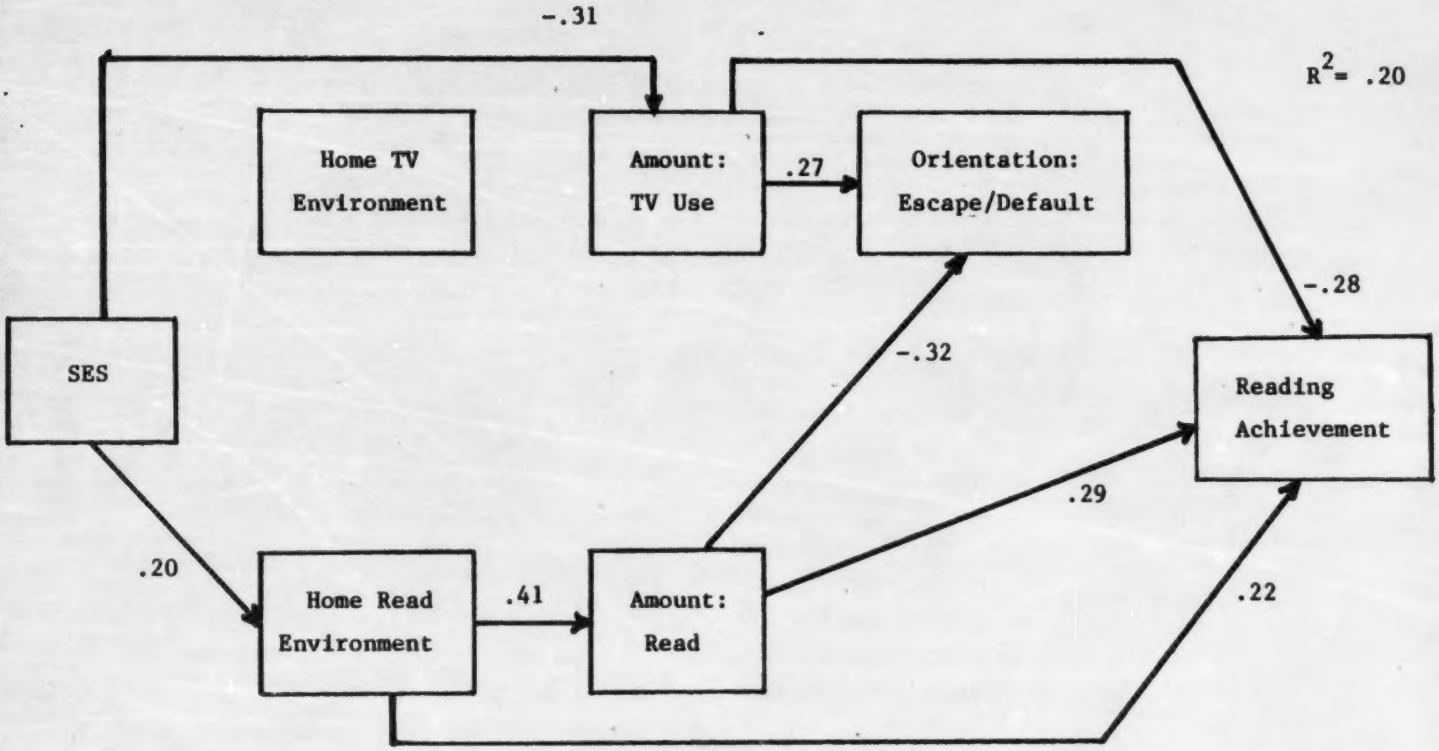

Figure 5. Path analysis of SES, Home Environment, Amount of Use, Escape/Default TV Orientation and Reading Achievement for Sixth Grade Children.

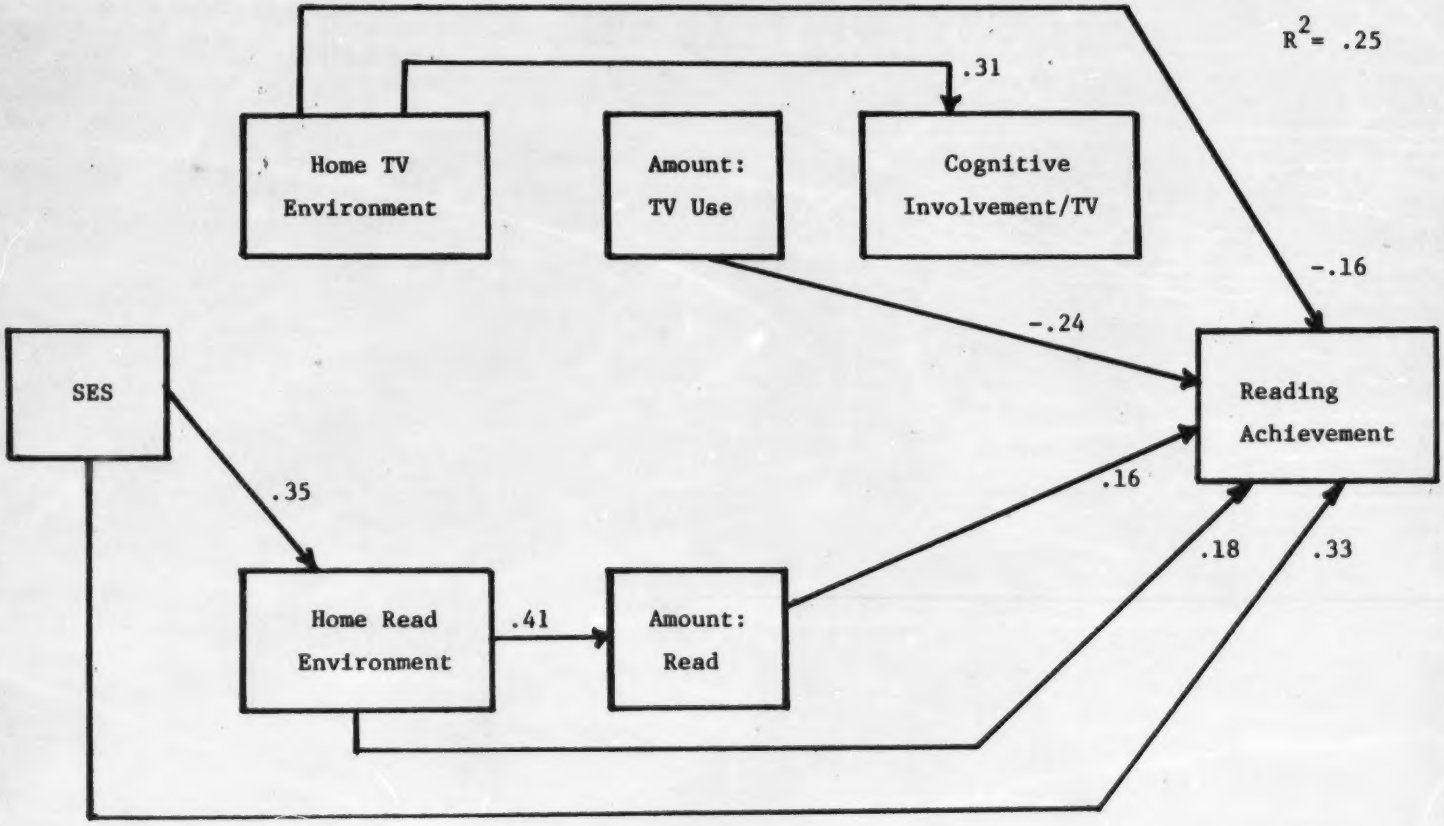

Figure 6. Path analysis of SES, Home Environment, Amount of Use, Cognitive Involvement with TV and Reading Achievement for Third Grade Children.

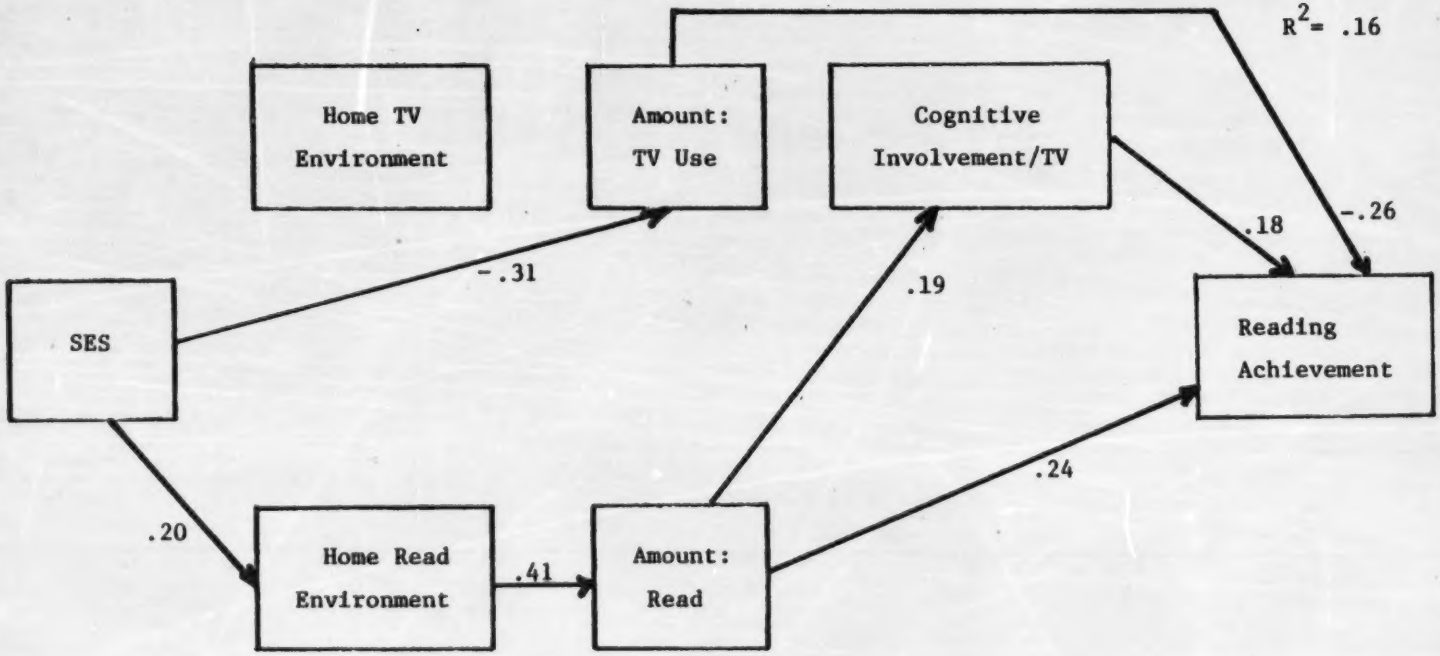

Figure 7. Path analysis of SES, Home Environment, Amount of Use, Cognitive Involvement with TV and Reading Achievement for Sixth Grade Children.